

**Bureau of Mining Regulation and Reclamation**  
**STABILITY REQUIREMENTS HEAP LEACH PADS**

April 22, 1994

Heap leach pads are mining operation process components that provide for environmentally safe placement of precious metal ore to be leached with process solution, primarily cyanide. Information from the items listed below is the minimum required for the Bureau of Mining Regulation and Reclamation (BMRR) to adequately review the environmental concerns related to stability of heap leach pads. All stability analysis submittals shall include the following.

1. Identify the stability analysis computer model or equations used.
2. Submit all inputs and assumptions used in the derivation of the stability results. Provide a short, one sentence justification for each of these values.
3. Identify seismic region and acceleration values used in the computer model and provide a short justification.
4. Provide heap leach pad design to include overall height, lift height, lift setback, and containment berm size or reference this information contained in another report submitted to this office.
5. Evaluate the heap's stability considering these modes of failure:
  - Infinite Slope Failure
  - Circular Failure
  - Block Failure
  - Wedge Failure

These evaluations should consider sliding through ore only, sliding through foundation soils and/or a containment dike, sliding along a liner interface, and entire heap mass instability involving sliding entirely or mostly along a liner interface.

6. Results shall be presented in terms of Factors of Safety for each evaluation. Recommended Factor of Safety are 1.3 (static) and 1.05 (pseudostatic) or greater. However, lower Factors of Safety may be acceptable if the design engineer can demonstrate that the displacement from the design seismic event will not compromise the integrity of the fluid management system or cause a release of contaminants to waters of the State.
7. Analyses results shall be submitted by a Professional Engineer registered in the State of Nevada.

Although not required with the stability analysis submittal, the actions required by the mine operators if a failure occurs will need to be addressed in the operations plans. Additionally, when designing heap leach facilities some consideration should be given to the post-closure/reclamation slope stability, slope steepness, and heap configuration.